



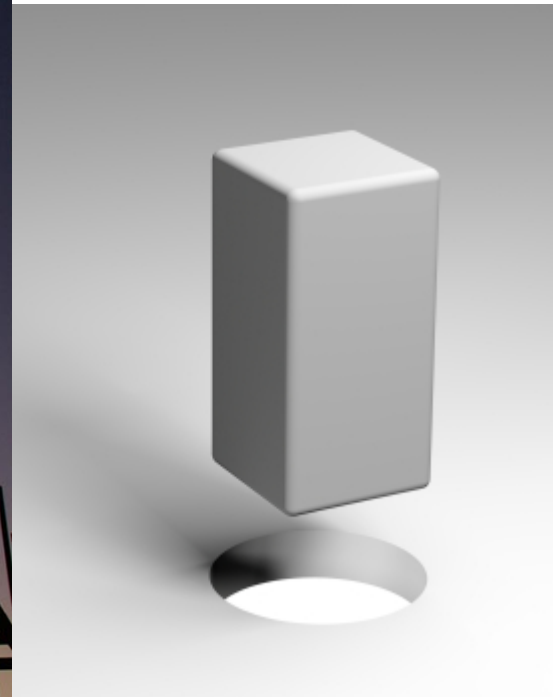
IBPC 2010 NIST

Terry Hartmann
Vice President,
Identity Solutions

4 March 2010

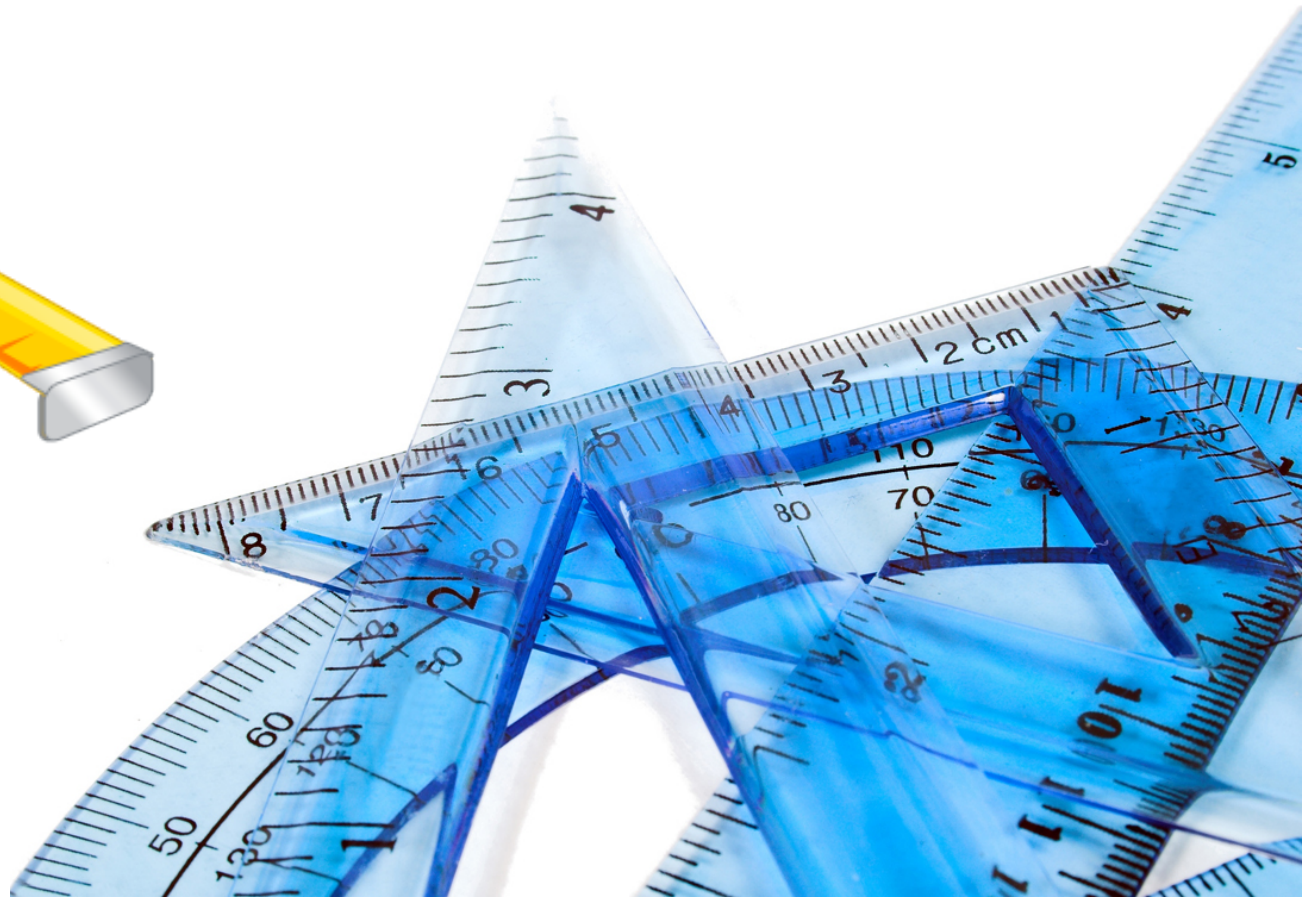
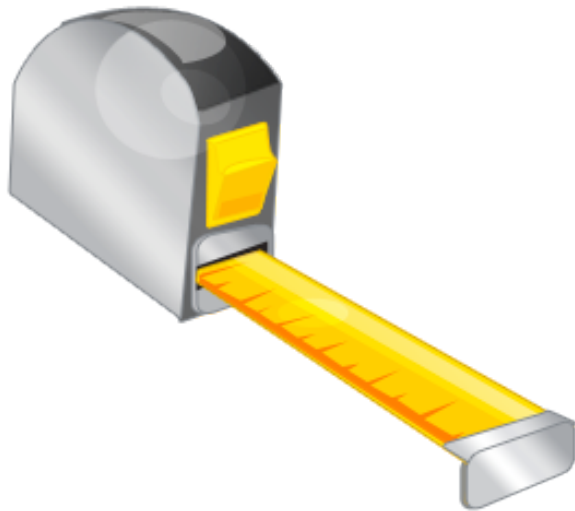


The Integrator Perspective



What is an integrator ?

What I wish I knew the Metrics for ?!



Opening Address Recap

PATRICK

- Integrator = Risk Mitigation
- Integrator Biometrics Interest
 - Scientific Discovery
 - Technical Discovery
 - R&D
 - Capability of vendor (reliability, avail)
 - Comparative
 - Interoperability
 - Conformance (Reqmts, Stds)
 - Regression (should we update)
 - Calibration (what threshold)
 - Jim (Useability, Vulnerability, ROI)

Tony

- Have tests been driven by what can be done, rather than what should be done ?
- Are tests missing the point ?

It's all about money !

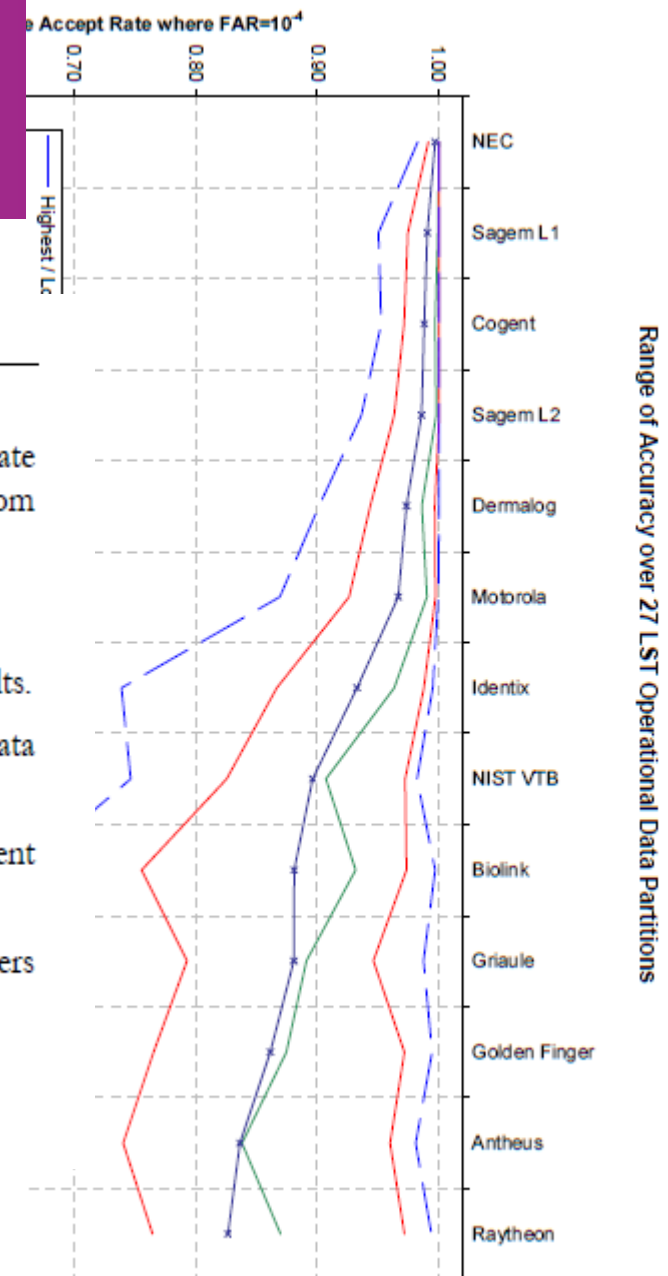
NIST FP Vendor Tech Eval 2003

FpVTE 2003 SUMMARY OF RESULTS

FpVTE 2003 included operational fingerprint data from a variety of U.S. and State Government sources. The test used 48,105 sets of flat slap or rolled fingerprint sets from 25,309 individuals, with a total of 393,370 distinct fingerprint images.

The FpVTE Analysis Report concludes:

1. Of the systems tested, NEC, SAGEM, and Cogent produced the most accurate results.
2. These systems performed consistently well over a variety of image types and data sources
3. These systems produced matching accuracy results that were substantially different than the rest of the systems
4. The variables that had the largest effect on system accuracy were the number of fingers used and fingerprint quality:
 - Additional fingers greatly improve accuracy
 - Poor quality fingerprints greatly reduce accuracy



The turn of the century ...

FACIAL RECOGNITION VENDOR TEST 2000

Participants

Banque-Tec International

C-Vis Computer Vision

eTrue (formerly Miros)

Lau Technologies ([www](http://www.lautechnologies.com))

Visionics Corporation ([www](http://www.visionics.com))



Lautechnologies.com

network
solutions

This Page Is Under Construction - Coming Soon!

[Why am I seeing this 'Under Construction' page?](#)

[The Promise Movie](#)

[Vietnamese DVD](#)

[Hk Movie](#)

[Vietnamese Music](#)

[Nhac Phim](#)

[Phim Hai](#)

[Dowload Phim](#)

[Vietnamese Videos](#)

[Infernal Affairs 2](#)



Oops! This link appears to be broken.

Google toolbar

Suggestion:

- Search on Google:

UNISYS
imagine it. done.

FRVT2002

Company: AcSys Biometrics Corp
Web Site: <http://www.acsysbiometricscorp.com>

→ **Company:** C-VIS Computer Vision und Automation GmbH
Web Site: <http://www.c-vis.com>

Company: Cognitec Systems GmbH
Web Site: <http://www.cognitec-systems.com>

Company: Dream Mirh Co., Ltd
Web Site: <http://www.dreammirh.com>

Company: Eyematic Interfaces Inc.
Web Site: <http://www.eyematic.com>

Company: Iconquest
Web Site: <http://www.iconquesttech.com>

→ **Company:** Identix
Web Site: <http://www.identix.com>

Company: Imagis Technologies Inc.
Web Site: <http://www.imagistechnologies.com>

Company: Viisage Technology
Web Site: <http://www.viisage.com>

Company: VisionSphere Technologies Inc.
Web Site: <http://www.visionspheretech.com>

FRVT2006

Participants

The following organizations are participating in the FRVT 2006 evaluation:

- Animetrics, Inc.
- Carnegie Mellon University
- • Cognitec Systems GmbH
- Diamond Information Systems (DIS)
- Geometrix, Inc.
- Guardia
- • Identix, Inc.
- Neven Vision
- New Jersey Institute of Technology (NJIT)
- Nivis, LLC
- Old Dominion University
- Panvista Limited
- Peking University, Center for Information Science
- PeopleSpot Inc.
- Rafael Armament Development Authority Ltd.
- SAGEM SA
- Samsung Advanced Institute of Technology (SAIT)
- Tsinghua University
- Tili Technology Limited
- Toshiba Corporation
- University of Houston
- • Viisage

FRVT2006

FRVT 2006

- Verification rate =.99 at FAR =0.001
- Frontal
- Controlled illumination
- High resolution (400 pixels between the eyes)
- Large scale laboratory collection
- 6 MP camera

FRVT2002 vs FRVT2006

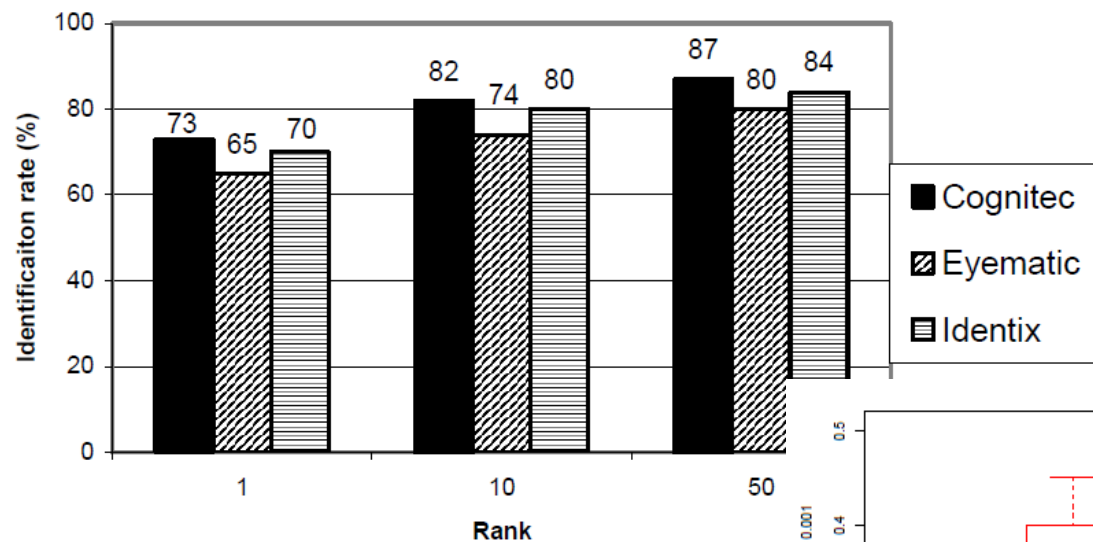


Figure 7. Identification performance for the three best system on a database consisted of 37,437 individuals. Identification rates are reported at ranks 1, 10 and 50.

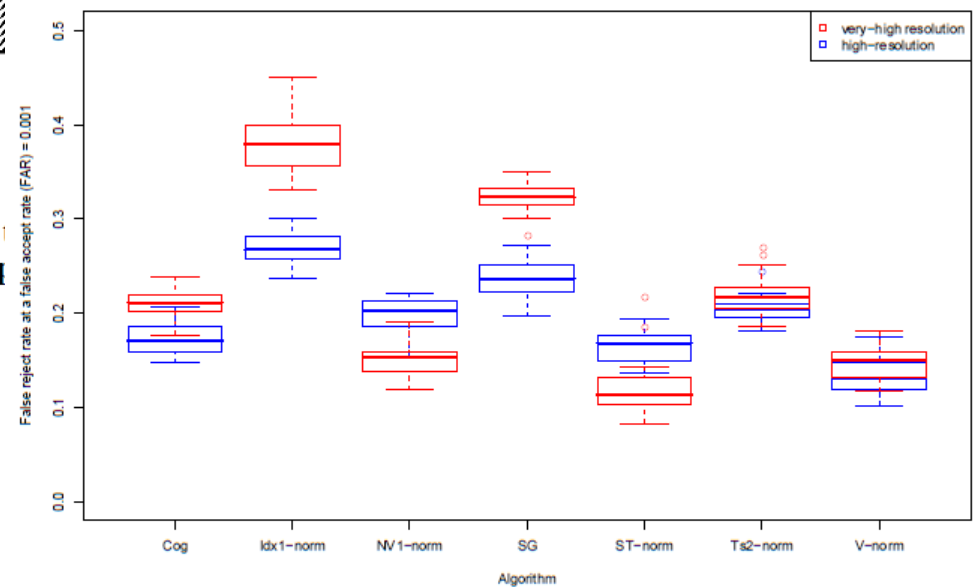


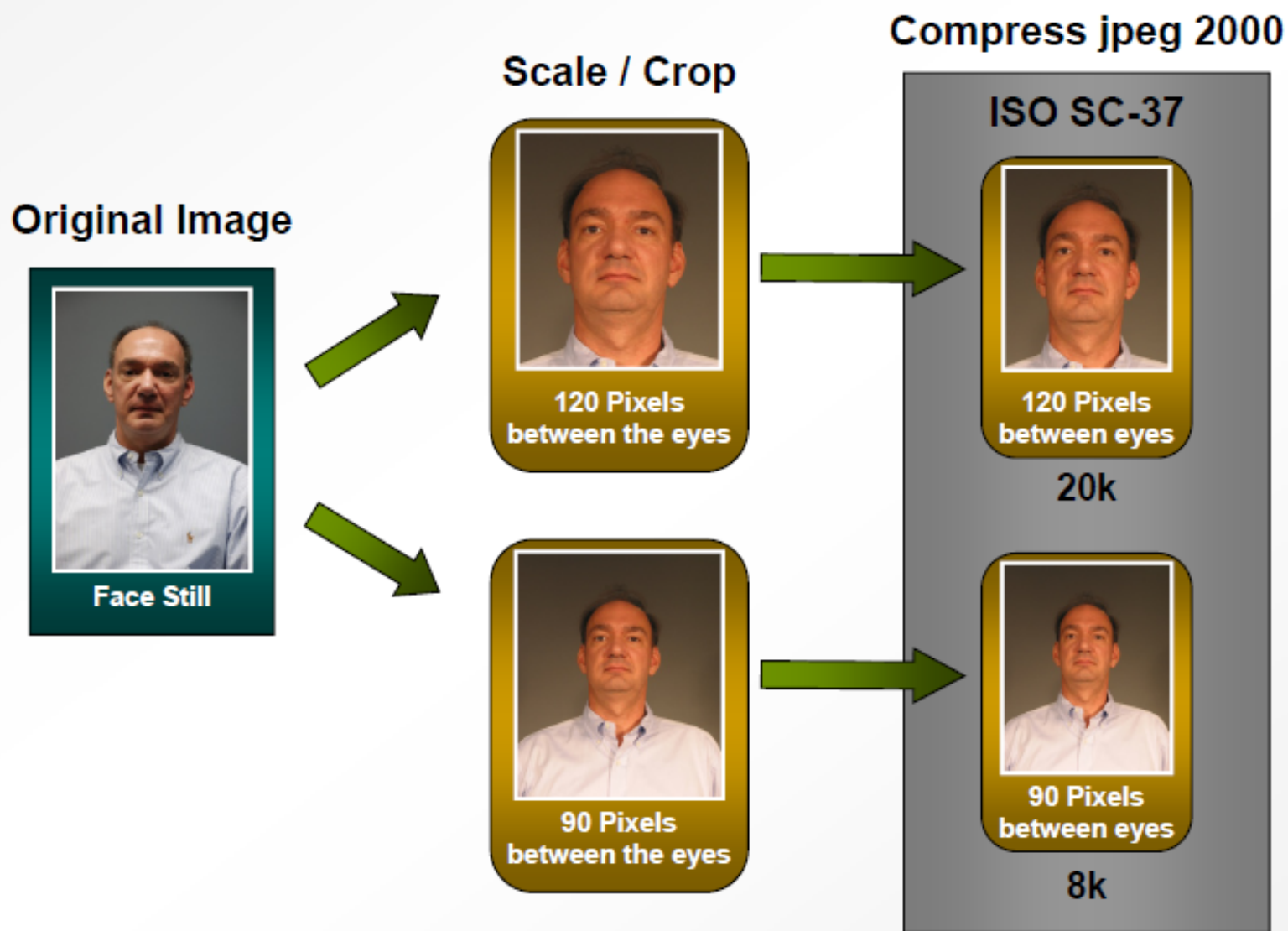
Figure 7: SUMMARY OF STILL FACE RECOGNITION PERFORMANCE ACROSS ILLUMINATION CHANGES ON THE VERY-HIGH AND HIGH RESOLUTION DATASETS. FOR COGNITEC AND SAGEM, RESULTS FOR THE COG1-NORM AND TS2-NORM ALGORITHMS ARE REPORTED ON THE VERY-HIGH RESOLUTION DATASET, AND RESULTS FOR THE COG1-ITC AND V-ITC ALGORITHMS ARE REPORTED ON THE HIGH-RESOLUTION DATASET.

MBGC Still Face Goals

- ICAO Passport Standard
 - Low resolution (90-120 pixels between the eyes)
 - Compressed imagery (8KB to 20KB)
- Many applications of still face involve:
 - Unconstrained illumination
 - Low resolution
 - Compressed imagery
 - Non-frontal

MBGC Still Face challenge problem addresses these constraints.

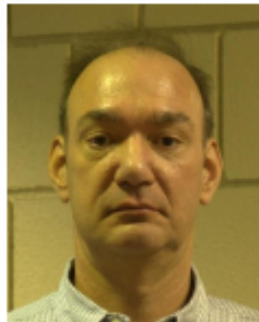
Still Face Processing



Uncontrolled

vs. Uncontrolled

Number of Images
8,014



No Compression

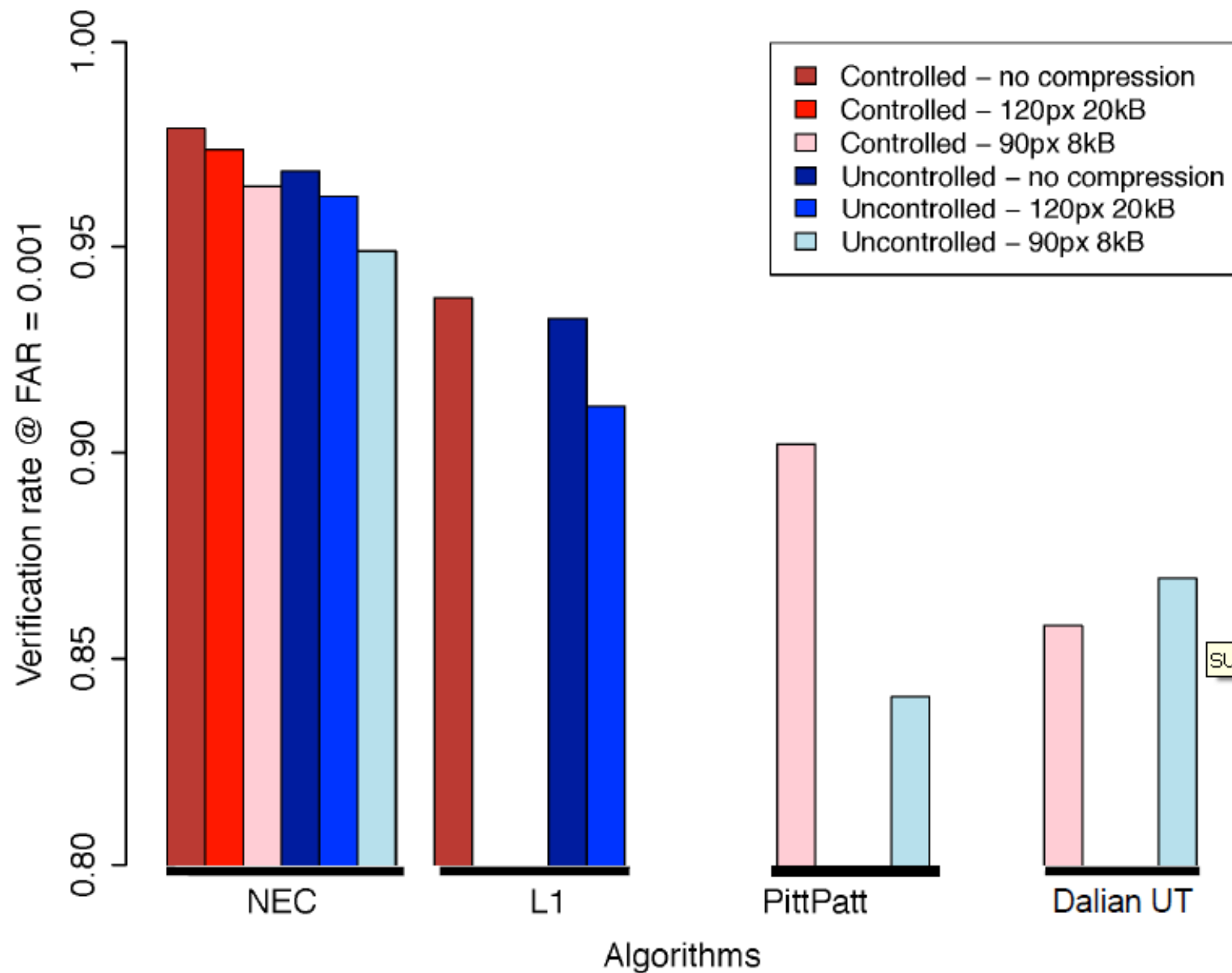
Compression
120 pixels
20 KB

Compression
90 pixels
8 KB

Number of Images
10,687



Summary Frontal



Customers use NIST tests in Evals

“If the proposed FR Solution product(s) have been tested in the National Institute of Standards and Technology’s (NIST) Facial Recognition Test FRVT 2006, the results of the test can be used as a substantiation of compliance with requirements.”

“Certification that the proposed AFIS underwent the Fingerprint Vendor Technology Evaluation of 2003 (FPVTE 2003) – Large Scale Test Category by the National Institute of Standards & Technology (NIST).”


???

- How many times in the last 2 days have we heard presenters only ask questions ?
- Customers look to industry (integrators and vendors) for answers, and end up in frustration doing tests themselves disguised as PoC
- Jim: “Disconnect between lab performance and field results”
- BSI: “all world is ignoring spoofs”

Tell me the answers !

- terry.hartmann@unisys.com
- Phone +1 267-475-7618
- Reston, Virginia, USA



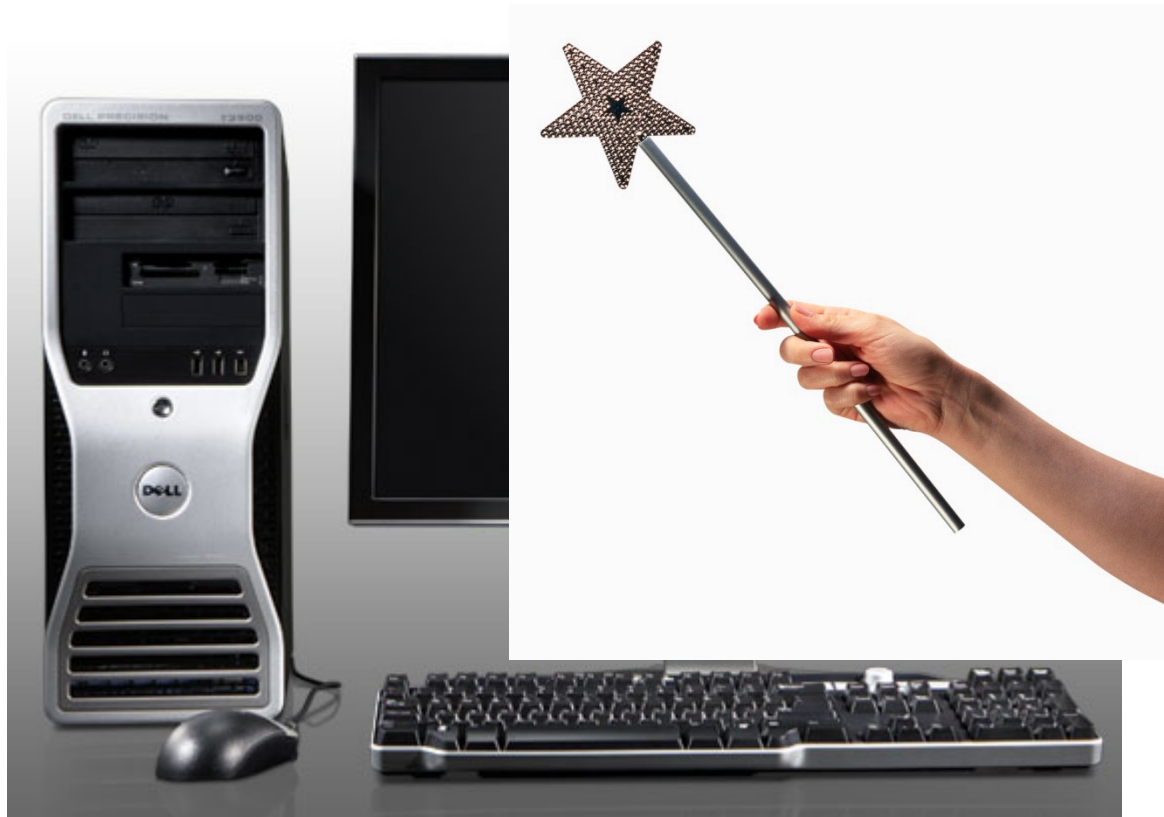


Have you
ever bought
a PC ?

Maybe you bought this once ?



www.pc-vendor.com



Processor ?

Dual Core Intel® Xeon® W3503 2.40GHz, 4M L3, 4.8GT/s

Operating System ?

Genuine Windows® 7 Professional Bonus-Windows XP Professional downgrade

Monitor ?

3rd Party Monitor Included

Memory ?

2GB, 1066MHz, DDR3 SDRAM, NECC (2 DIMMS)

Boot Hard Drive ?

250GB² SATA 3.0Gb/s with NCQ and 8MB DataBurst Cache™

CD-ROM, DVD and Read-Write Devices

16X DVD+/-RW w/ Cyberlink PowerDVD™ and Roxio Creator™ Dell Ed

Graphics ?

512MB NVIDIA® Quadro® FX 580, DUAL MON, 2 DP & 1 DVI

Resource DVD

Resource DVD - contains Diagnostics and Drivers

Hardware Support Services ?

3 Year Basic Limited Warranty³ and 3 Year NBD On-Site Service⁴

Integrator Metric Wish # 1

That I could buy my
biometric algorithm
online

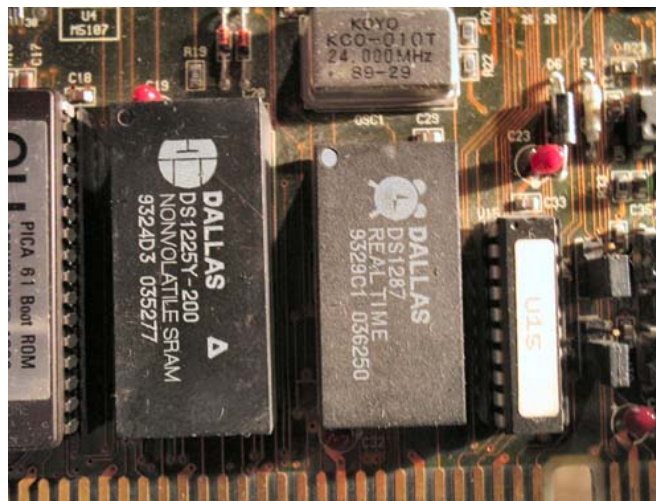
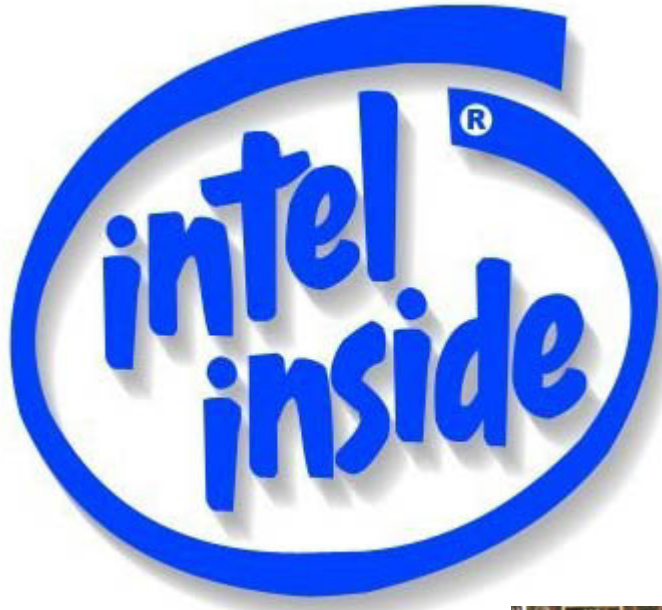


But my competitors
couldn't 😊

STAR WARS THE CLONE WARS REPUBLIC HEROES



What's under the covers ?



Metric Wish # 2



Government

- Conduct Funded Tests
- Conduct Bakeoffs
- Speak at conferences about
 - what their program is
 - what they tested for
 - what they did
 - how they did it
 - lessons learned
- Test labs a bit more open but NDA constrained



But Government

Don't speak at conferences about

- which vendors were in the field
- how they downselected
- quantitative measures
- what the relative results were between vendors
- what's their "biometric" FRR
- what's their operational FAR



Metric Wish # 3

That Public Sector
testors would publish/
circulate definitive
comparative results

and that the media
would ignore them ;)



Face ... the final frontier

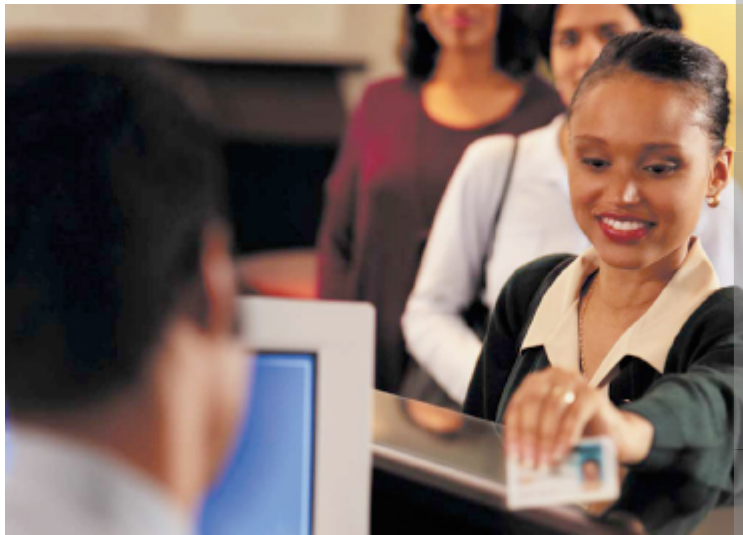


Is this the Same Person ?

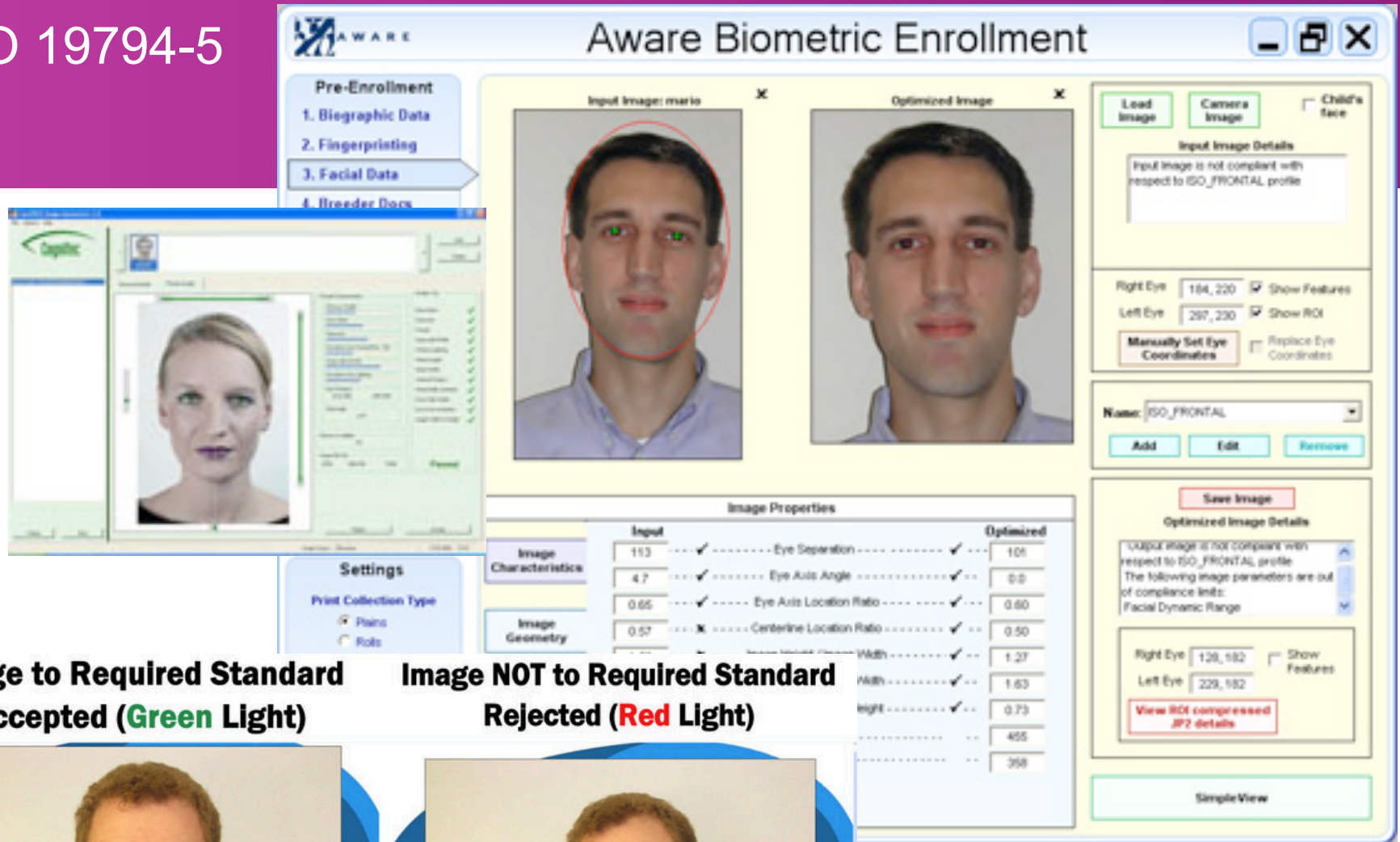


1. Yes
2. No
3. It's a stupid, ill-formed question

Real People Performance vs Auto FR



ISO 19794-5



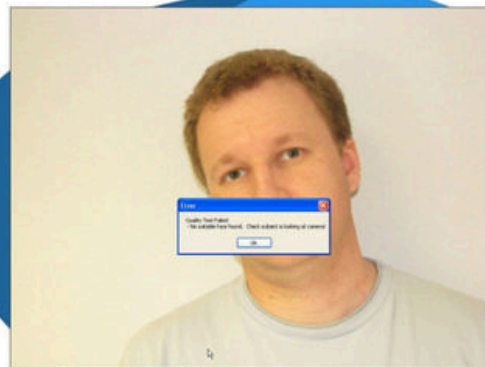
**Image to Required Standard
Accepted (Green Light)**

**Image NOT to Required Standard
Rejected (Red Light)**



Resume

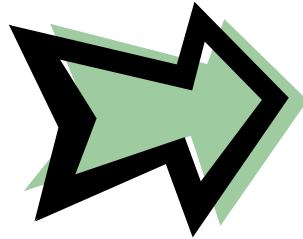
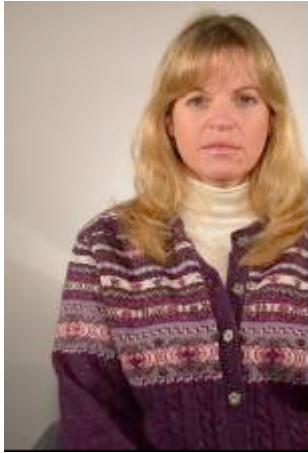
Save



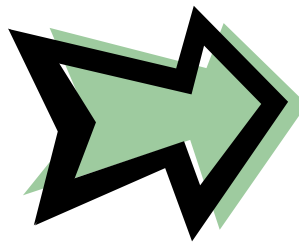
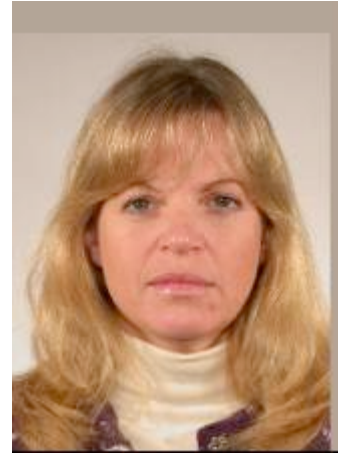
Resume

Save

Auto-fixing Positioning



Centre head



Eyes
horizontal



Metric Wish # 4

Facial Image Quality Software Comparative Test

- Do they really meet ISO 19794-5 ?
- Are they algorithm independent ?
- Is there value in auto-correction ?
- Is it an enrolment tool or a matching tool ?
- Is it 'safe' to do so?
- How do we quantify it's worthwhile ?
- QA the eyefinder ?





Have you
ever bought
a digital
camera ?

Now tell me ...

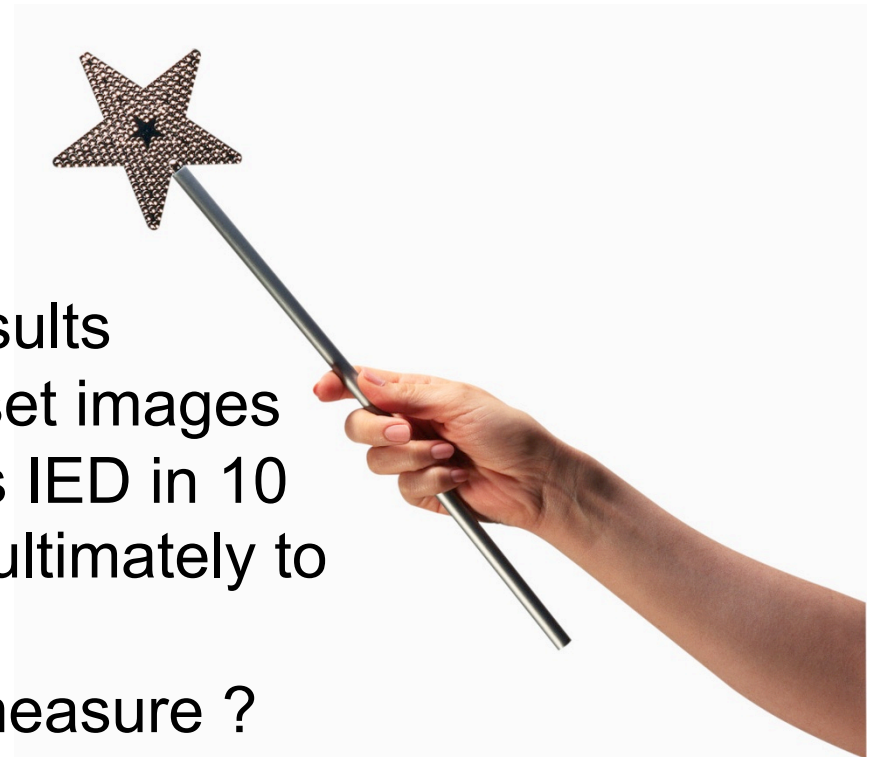
- Now you have it
- How many Megapixels do you capture at ?
- How many Megapixels do you save at ?
- Email ?, Facebook ?



Metric Wish # 5

What resolution to capture, save, compress ?

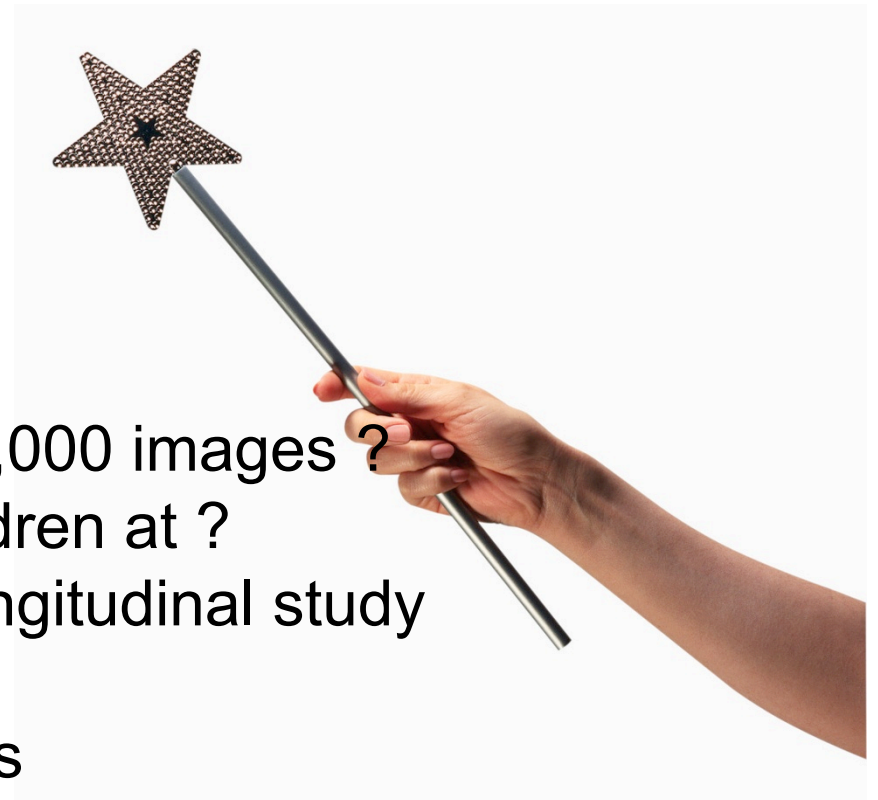
- Low resolution image matching results comparisons – study of resolution set images ranging from 20 pixels to 120 pixels IED in 10 pixel increments – plot the curves, ultimately to 400dpi
- Can we set a “resolution” quality measure ?
eg FRVT2006: 6MP, 400 pixels between eyes



Metric Wish # 6

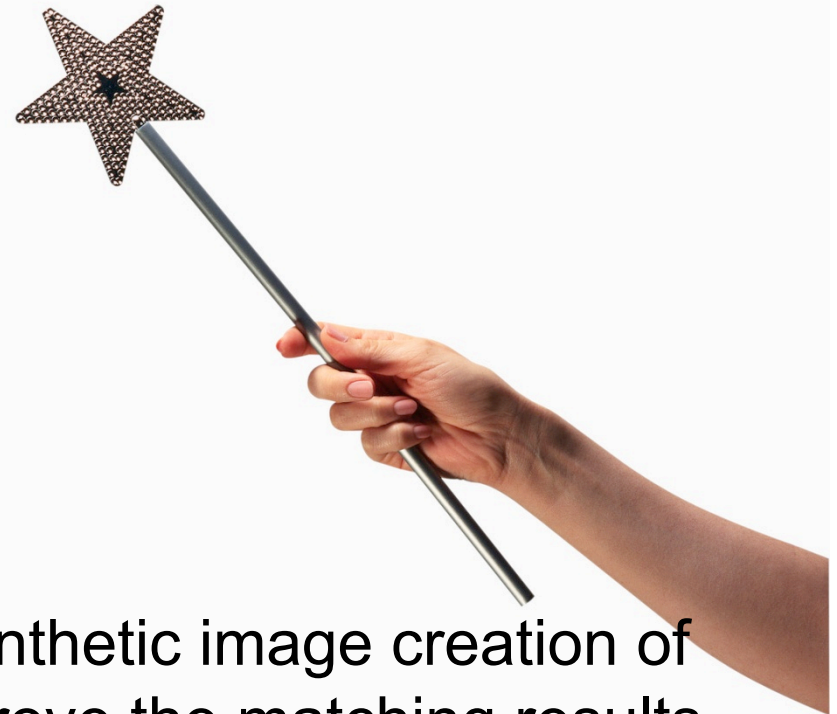
Typical customer questions

- How long does it take to enrol 100,000 images ?
- What age can I reliably match children at ?
- Effects of aging on FR results – longitudinal study over 0-20 years
- Effects of dramatic weight gain/loss



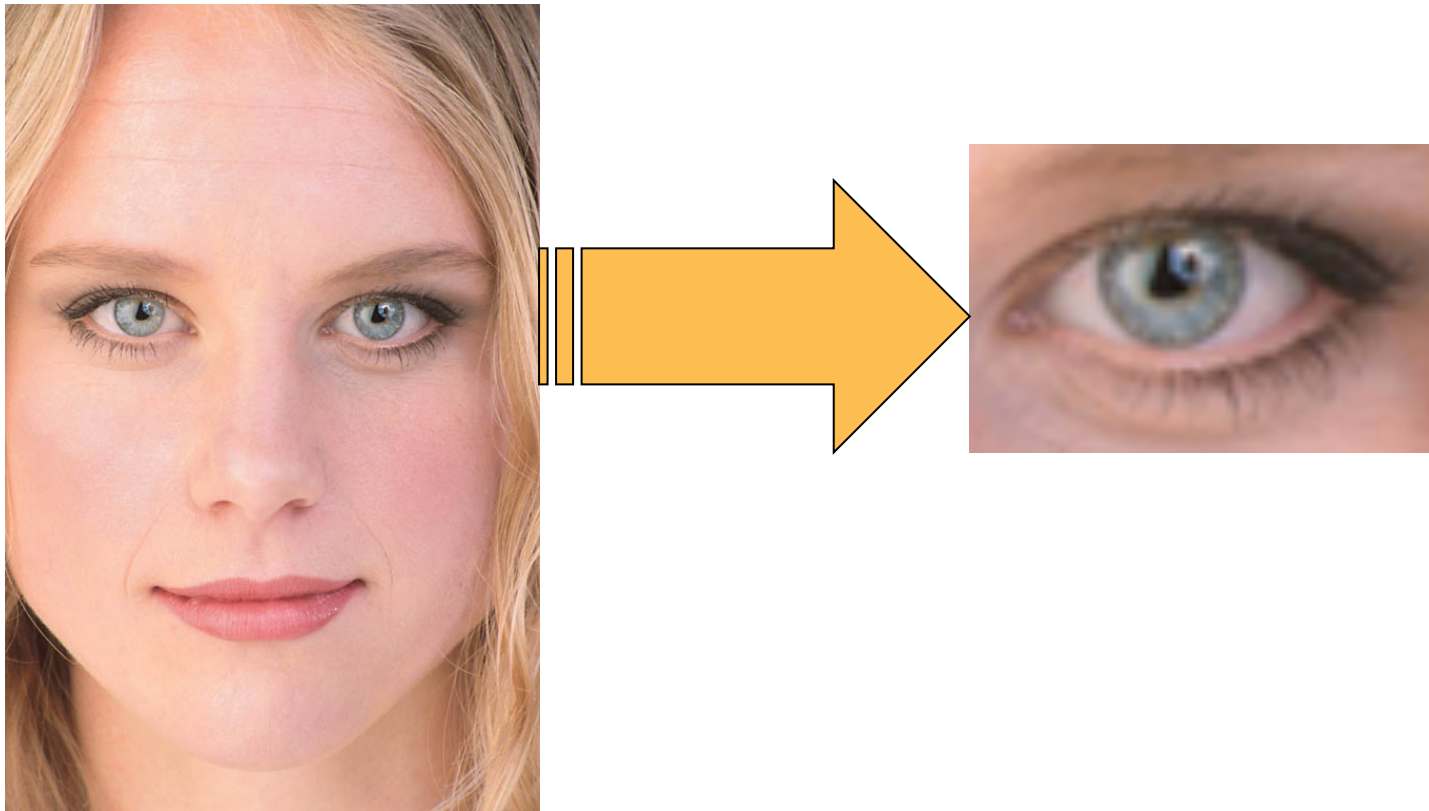
Metric Wish # 7

Sophisticated customer questions



- To what extent can/cannot 2D-3D synthetic image creation of the [probe or gallery or watchlist] improve the matching results (1:n and 1:1) ?
- What do the FRVT2002 graphs look like in 2010 ?
- Where can I buy morphed Facial Image detection software ?

Face and Iris



Metric Wish # 8

What image attributes (eg resolution) do you need to capture a facial image to zoom/crop out an iris acceptable for iris recognition ?





Metric Wish # 9



Iris Global Implementations

- What's the largest ?
- Have False Matches been detected ?
- What's the operational FAR ?



Metric Wish # 10



Iris (still, motion, distance)

- Results vs Iris Still
- Interoperability ?
- Relative verification performance results ?



Metric Wish # 11



FTE: Finding the iris

- Enrolling with/without glasses
- Effect of glasses
- Polarised lenses
- Occlusion
- Jetlag
- Hangovers



Metric Wish # 12

Legacy and Upgrade Conversion Times

- Face per million
- Finger per million
- Iris per Million

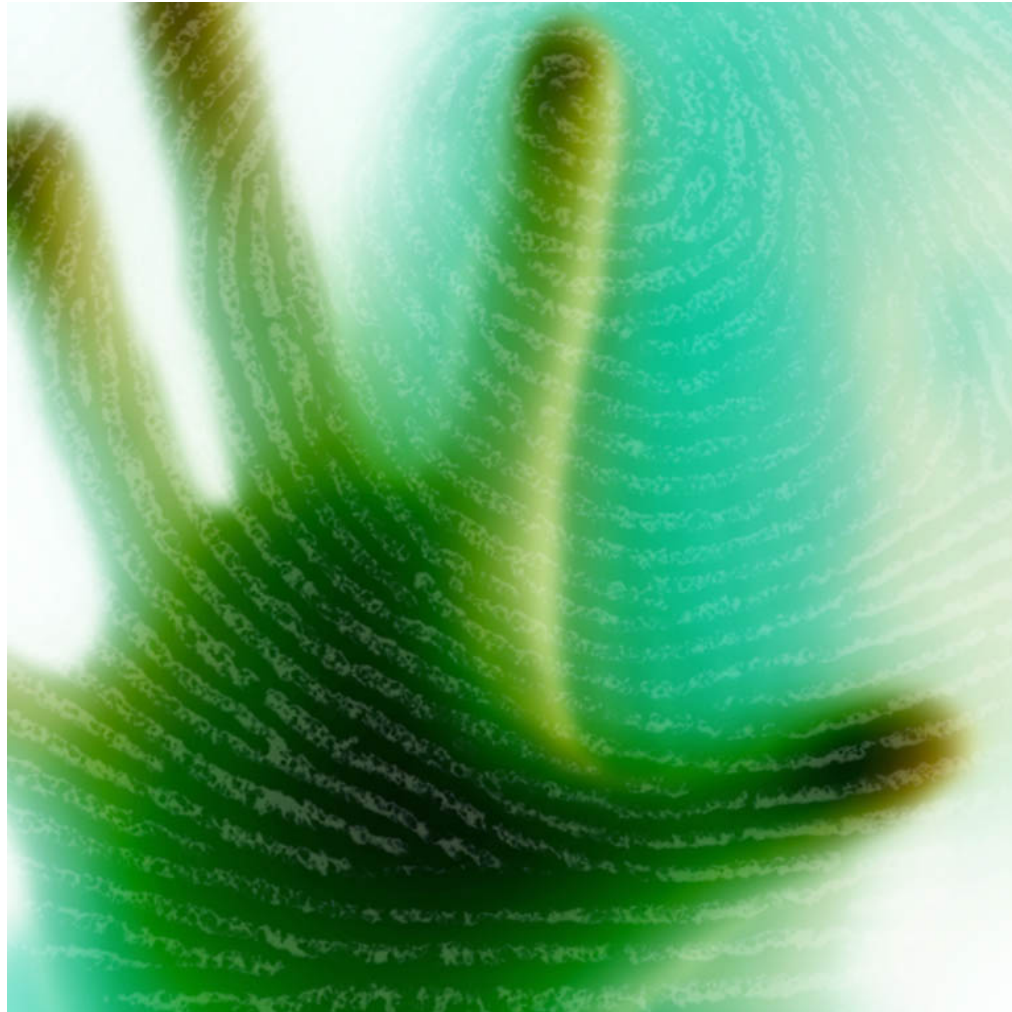


Metric Wish # 13

Liveness Detection

- How does it actually work ?
- Prove it works .. well to what extent ;)





Finger



- What is the “maximum” size of a large AFIS system (before it ceases to “work”) ?
- Fingerprint quality and interoperability: is it possible to design a standard that is algorithm independent **and** good enough for large databases ?
- What is the matching performance for ISO standard template matching in larger databases? Which vendors support this standard template (long/short variant)
- Difference in FAR/FRR between 250/500/1000 dpi sensors for 1:N matches
- Touch vs no-touch sensors

In the Vein of Vascular ...

- Whats the largest global implementation ?
- What veins? (palm, finger, back of hand...)
- Effects of aging for vein recognition eg moving to surface
- At what age do the vein patterns become stable enough to use – ie use for children/teenagers/adults



Metric Wish # 14

Demystifying Vascular

- Operational Results (FAR, FRR) ?
- 1:1 rates vs other biometrics ?
- 1:1 Results on children .. A key potential market
- 1..N ?



Voice

- Comparative testing (FRVT-like) of various products = **NIST SRE10** ?
- 1:N ?



All - Multimodal & Fusion

- Fusing face/fingerprint: what is the impact on performance in terms of speed and accuracy, what is the optimum and what to do to prevent weakening the system
- The same question for face/iris and fingerprint/iris
- 2 for the price of one ? (face/iris, finger/vein)
- How fuse ?
 - 1:N for reducing search times in multimodal env
 - 1:1 for increasing confidence in the match

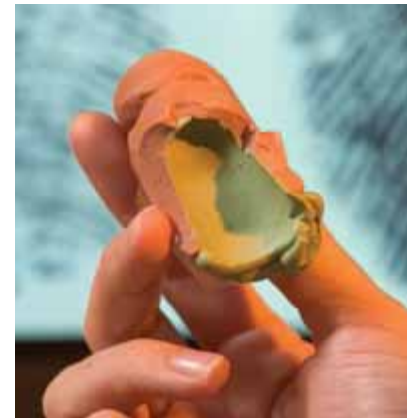


All - Template sizes

- What is template size in for this vendor for a given raw image ?
 - At rest
 - In cache
- Can be bigger than the raw image
- Is growing and growing year-on-year and while storage is not an issue, it is an issue for mobile devices, transmission speeds etc
- Multiple pass options (fusing your own matcher)

All - Spoofing

- Fingerprint is targeted – eg BSI yesterday
- What about Face ?
- What about Iris ?
- What about Vein (and those claims it can't be spoofed) ?





Are tests missing the
point?
or

Is it just that the
answers are jealously
guarded ?



Please send all the answers to:

terry.hartmann@unisys.com